

Galactic Observer

John J. McCarthy Observatory

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July/August 2011

Coming Home

The Space Shuttle Endeavour on its final descent to the Kennedy Space Center on June 1, 2011, at the end of a 16-day mission to outfit the International Space Station. After one more Atlantis mission on July 8, the space shuttle program will end. Future missions will be launched aboard Soyuz spacecraft from the Baikonur Cosmodrome in Kazakhstan until a new private launch program is developed (see inset below).

Image Credit: NASA/Bill Ingalls



Image Credit:
NASA/Carla Cioffi

The John J. McCarthy Observatory

New Milford High School
388 Danbury Road
New Milford, CT 06776

Phone/Voice: (860) 210-4117

Phone/Fax: (860) 354-1595

www.mccarthyobservatory.org

JJMO Staff

It is through their efforts that the McCarthy Observatory has established itself as a significant educational and recreational resource within the western Connecticut community.

Steve Barone	Dr. Parker Moreland
Don Besaw	Allan Ostergren
Colin Campbell	Cecilia Page
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Elaine Green	Diana Shervinskite
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Tom Heydenburg	Jon Wallace
Phil Imbrogno	Bob Willaum
Bob Lambert	Paul Woodell

Amy Ziffer

Galactic Observer Editorial Committee

Managing Editor

Bill Cloutier

Production & Design

Allan Ostergren

Website Development

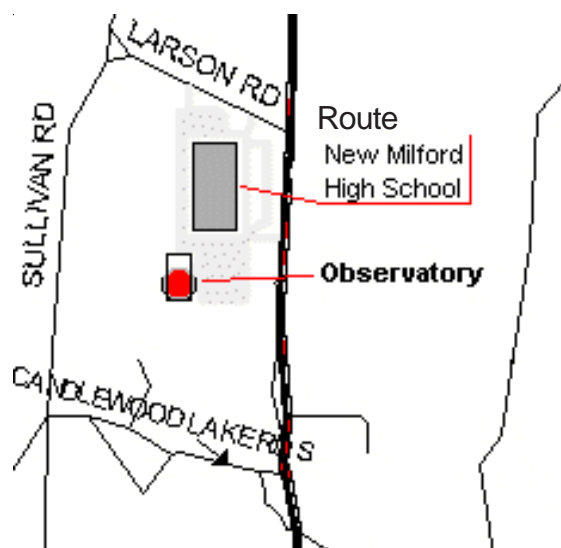
John Gebauer

Josh Reynolds

Technical Support

Bob Lambert

Dr. Parker Moreland



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July/August Astronomy Calendar and Space Exploration **Almanac**



Year of the Solar System

NASA announced on Oct. 7, 2010 that the upcoming year would be “The Year of the Solar System.” The “Year,” however, is a Martian year and, as such, 23 months in length. Some of the highlights of the “Year” of exploration are:

Date	Mission		Status
4 Nov 2010	Deep Impact encounters Comet Hartley 2		Successful rendezvous, see http://www.nasa.gov/mission_pages/epoxi/index.html
19 Nov 2010	Launch of O/OREOS, a shoebox-sized satellite designed to test the durability of life in space		Ground stations receiving data
19 Nov 2010	Launch of an experimental solar sail (NanoSail-D) aboard the Fast Affordable Scientific and Technology Satellite (FASTSAT)		Delayed separation from FASTSAT on 17 Jan 2011, deployment confirmed, sail is operational
7 Dec 2010	Japan's Akatsuki (Venus Climate Orbiter) spacecraft		Spacecraft fails to enter orbit around Venus - now in orbit around the Sun
14 Feb 2011	Stardust NExT encounters Comet Tempel 1		Successful rendezvous; see http://stardustnext.jpl.nasa.gov/
17 Mar 2011	MESSENGER enters orbit around Mercury		First spacecraft to achieve orbit around Mercury; see http://messenger.jhuapl.edu/
18 Mar 2011	New Horizons spacecraft crosses the orbit of Uranus		4+ more years to Pluto; see http://pluto.jhuapl.edu/
16 Jul 2011	Dawn spacecraft arrives at the asteroid Vesta		
5 Aug 2011	Launch of the Juno spacecraft to Jupiter		
8 Sept 2011	Launch of twin GRAIL spacecraft to map Moon's gravitational field		
8 Nov 2011	Launch of the Phobos-Grunt sample-return mission		
25 Nov 2011	Launch of Mars Science Laboratory (MSL)		
Aug 2012	MSL lands on Mars		

Other notable events:

- June 28, 2011 Pluto at Opposition
- July 2011 End of the Space Shuttle Program
- October 8, 2011 2nd International Observe the Moon Night
- March 3, 2012 Mars at Opposition
- May 20, 2012 Annular Solar Eclipse (visible in southwest U.S.)
- June 6, 2012 Venus Transit
- Mid 2012 Opportunity reaches the rim of Endeavour crater

Mission Updates

Come September and the waning days of summer, the Dawn spacecraft will have reached its first destination and the Juno spacecraft will be on its way to Jupiter.

Dawn

The Dawn spacecraft acquired its first image of the asteroid Vesta in early May. Appearing in the image as a group of bright pixels among a field of stars, the spacecraft was still 1.21 million kilometers (752,000 miles) and two months travel from Vesta.

Dawn is expected to enter orbit around Vesta on July 16th. The spacecraft will use its ion engine, powered by large solar panels, to gradually spiral into a lower orbit from which it will conduct its science mission. Vesta is the second most massive and brightest object in the asteroid belt. It is classified as a protoplanet due to its size (530 kilometers or 330 miles in diameter).

Dawn will spend a year in orbit around Vesta before leaving for the larger asteroid (and Dwarf Planet) Ceres. Dawn is expected to arrive at Ceres in February of 2015. Based upon distant observations, scientists believe that Vesta and Ceres evolved very differently during the early formation of the solar system. While their growth as protoplanets was disrupted by the formation of Jupiter, Dawn will find out just how different these two worlds are.

Juno

Final preparations are underway for the launch of the Juno spacecraft in August to the planet Jupiter. The spacecraft will take five years to complete its journey, arriving at Jupiter in 2016. Once in polar orbit, Juno will study the atmosphere, magnetosphere and gravity of the gas giant. Understanding the structure of Jupiter will further our knowledge of how planets formed in the early solar system.

Juno will orbit Jupiter in a highly elliptical path. The polar orbit will minimize the spacecraft's exposure to the planet's intense radiation field. The spacecraft will spend a year around Jupiter (32 orbits). Juno's instruments are powered by three massive solar panels that extend outward 8.9 meters (29 feet) from the spacecraft's body. This is the first time that solar panels have been used to power a spacecraft this far from Earth.

While Juno's solar panels are 50 percent more efficient and more radiation resistant than the solar panels on early deep space missions, they only generate 450 watts of electricity at Jupiter's great distance from the Sun (enough to power five average light bulbs).

Check out the new Juno mission website at <http://missionjuno.swri.edu/>.

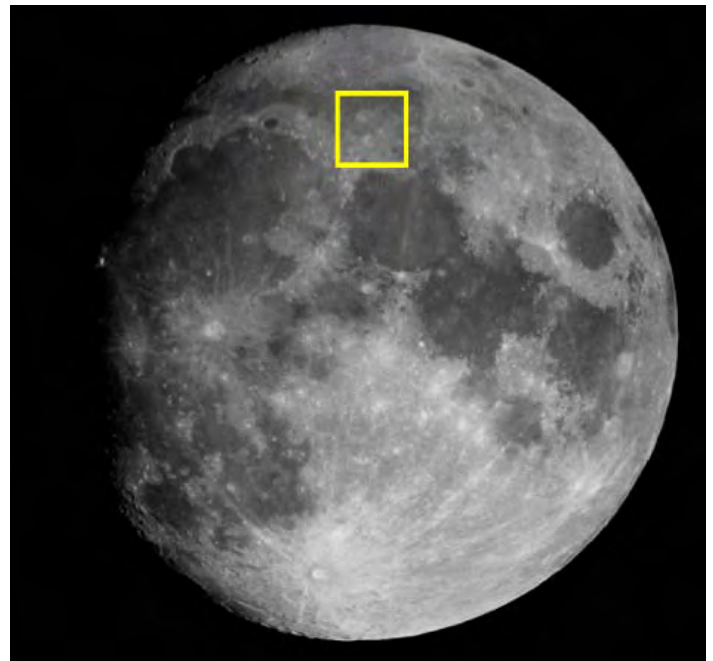


Artist Concept: NASA/JPL

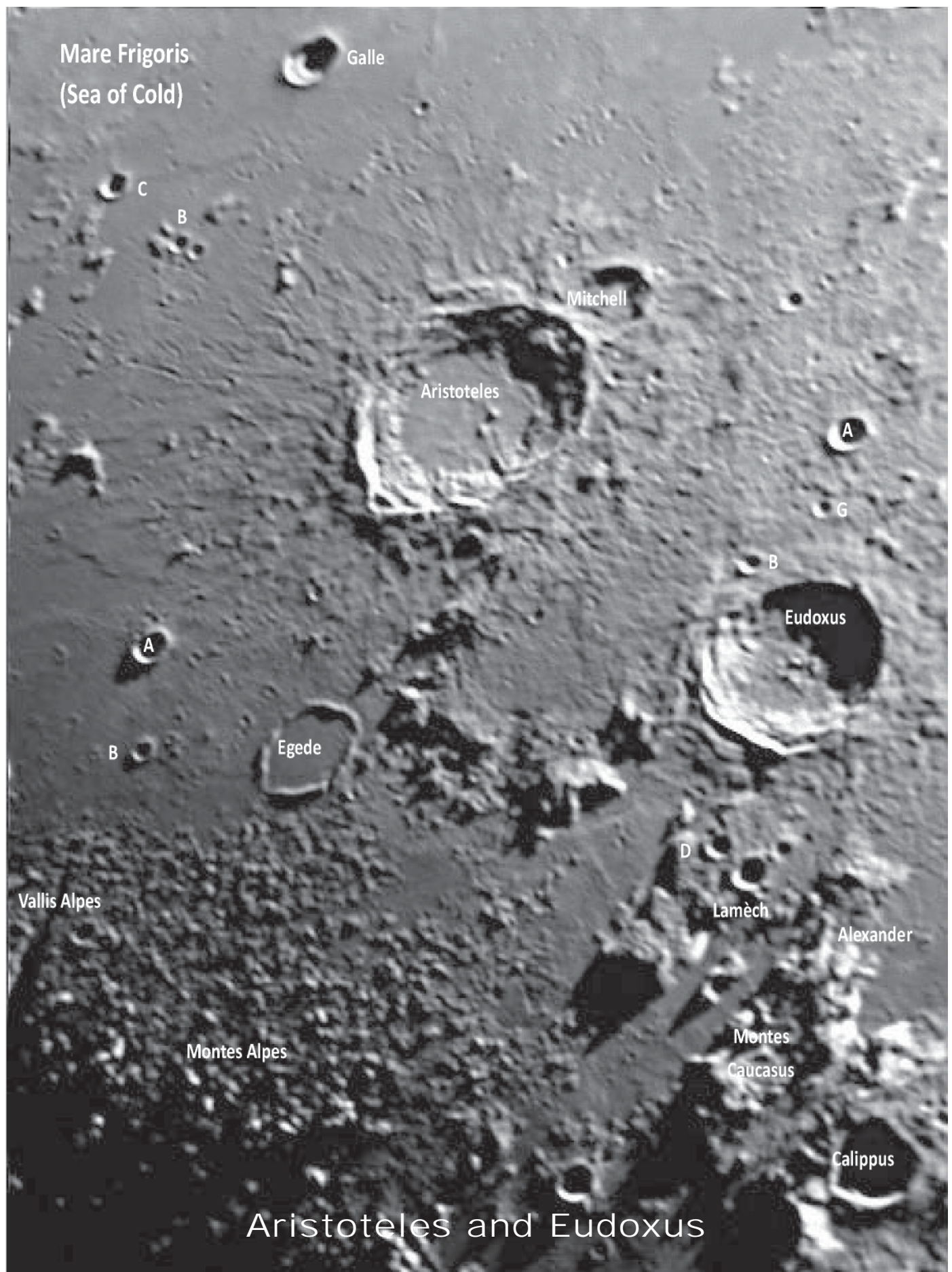
"Out the Window on Your Left"

It's been 39 years since we left the last footprint on the dusty lunar surface. Sadly, as a nation founded on exploration and the conquest of new frontiers, we appear to have lost our will to lead as a space-faring nation. But, what if the average citizen had the means to visit our only natural satellite; what would they see out the window of their spacecraft as they entered orbit around the Moon? This column may provide some thoughts to ponder when planning your visit (if only in your imagination).

The view this month is of the southeastern shore of Mare Frigoris (the Sea of Cold) and the craters Aristoteles and Eudoxus (see next page). Mare Frigoris has an elongated shape, approximately 1,500 km across and only 200 km wide. There is some speculation that Frigoris is



Lunar "seas" and "lakes" are actually expansive low-lying plains formed by ancient lava flows



actually a shallow part of the Imbrium basin, separated by ejecta from the basin's formation.

Aristoteles is named for the Greek philosopher Aristotle (384 BC – 322 BC), a student of Plato and teacher of Alexander the Great. Eudoxus of Cnidus, a Greek astronomer, mathematician, and physician was also a student of Plato.

Aristoteles and Eudoxus are two of the larger and younger craters in Mare Frigoris. Aristoteles has a diameter of 87 km (54 miles) and Eudoxus a diameter of 67 km (42 miles). Eudoxus is younger (less than a 1.1 billion years) than Aristoteles which is somewhere between 1.1 and 3.2 billion years old.

As seen in the photo on the following page, Aristoteles and Eudoxus display the characteristics of large complex craters with terraced walls and central peaks, although the peaks are not distinct. A major impact event left a thick layer of ejecta debris and cratering across the

Imbrium basin. This may have had an effect on how the underlying rock rebounded after the impact, which creates the central peak.

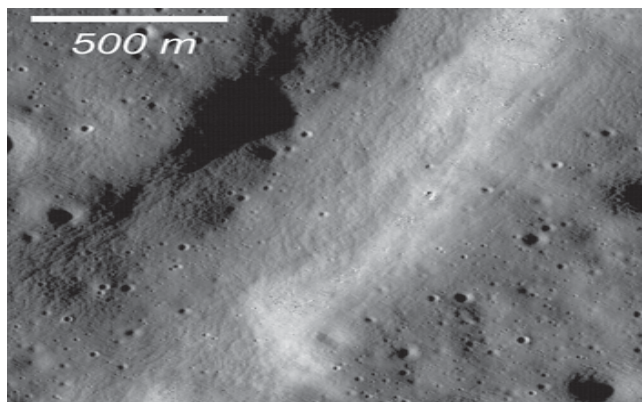
Southwest of Aristoteles is Egede, the remains of a crater that has been flooded by lava. Only the rim remains visible. Southwest of Egede and in the bottom left hand corner of the photo is Vallis Alpes (the Alpine Valley), still in shadow. The valley is actually a depression or graben, formed when the surface drops between two parallel faults.

Montes Caucasus (the Caucasus Mountains) is a rugged segment of lunar terrain that partially separates Mare Imbrium (the Sea of Showers or Rains) from Mare Serenitatis (the Sea of Serenity). The Montes Alpes form the northeastern border of the Mare Imbrium. The range includes hundreds of peaks, some rising to a height of 3,600 meters (12,000 feet). The Alpes extend from the Caucasus Mountains, northwest to the crater Plato.



Source: NASA

North pole view of the Moon taken by Galileo spacecraft in 1992. Mare Imbrium is at top left, with Mare Serenitatis (middle left), Mare Tranquillitatis (lower left).



Graben are common extensional features on the Moon as well as the other terrestrial planets and icy satellites. (NASA/GSFC/Arizona State University).

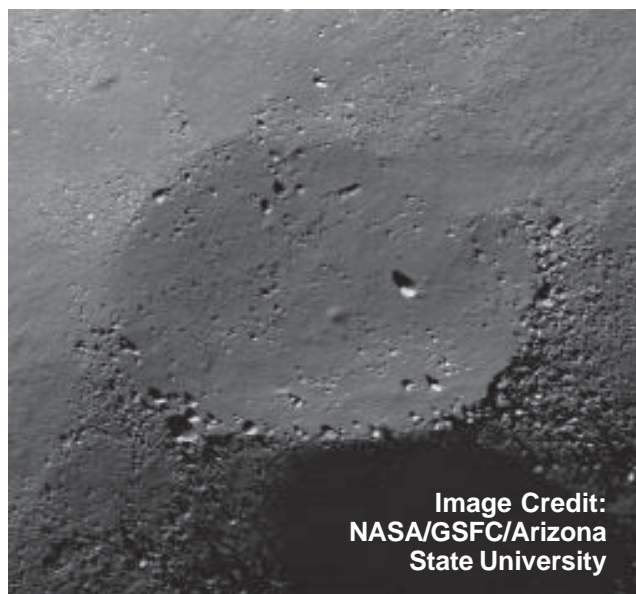


Image Credit:
NASA/GSFC/Arizona
State University

Mare Frigoris



The Rio Grande Rift, extending from Colorado into Mexico, is marked by a series of depressions (known as graben) punctuated with uplifted mountains. ISS crew photo, 2005.

Final Flight



The final flight of the space shuttle Atlantis signals the end of an era. The space shuttle, the first reusable spacecraft, operated for 30 years. While its mission changed over the years, the orbiter's payload capacity made the assembly of large structures in space, like the International Space Station, possible. The shuttle launched multiple deep space missions and its five servicing visits to the Hubble Space Telescope left it a much superior instrument than when originally deployed. In 30 years, the five orbiters will have traveled a combined distance of approximately 530 million miles (the distance to Jupiter) in 135 missions



PostSpace Shuttle Transportation

Until private industry develops a reliable replacement for carrying astronauts into space, NASA will rely on the Russian Soyuz spacecraft for rides to and from the International Space Station (ISS).

The Soyuz spacecraft was originally designed by Korolyov Design Bureau in the 1960s and succeeded the Voskhod spacecraft for carrying Soviet cosmonauts into space. It was designed as part of the Soviet's Moon program.

Despite two early fatal flights, the Soyuz has become one of the most reliable and widely used spacecraft today. The photos (clockwise from the top), show the spacecraft being integrated with its launch



vehicle at the Baikonur Cosmodrome in Kazakhstan (Credit: NASA/Victor Zelentsov), approaching the ISS (Credit: NASA) and landing in Kazakhstan (Credit: NASA/Bill Ingalls).

The Soyuz, while capable, has limited passenger and cargo carrying capacity. However, being the only option available, NASA recently signed a contract with Russia for 12 round trips to the ISS at an approximate cost of \$63 million dollars per seat.

Enterprise



Currently on display at the Smithsonian's National Air and Space Museum's Steven F. Udvar-Hazy Center, the Enterprise is destined for a permanent home at New York City's Intrepid Sea, Air & Space Museum. The Enterprise will be replaced by the space shuttle Discovery at the Smithsonian.

Summer Activities

SUMMER IS A great time to enjoy the night sky. Some suggestions for this summer:

1. **Attend a star party.** Star parties are gatherings of amateur astronomers where the general public is invited to share the wonders of the night skies with skilled observers and through telescopes of every size and shape. A calendar of dates and locations across the United States is available at www.skyandtelescope.com. Closer to home, the McCarthy Observatory hosts a star party on the second Saturday of each month. Please join us on July 9th and August 13th with your family and friends for a memorable evening under the stars.

2. **Take in a meteor shower.** With no telescope required, this naked-eye activity can be enjoyed in a lawn chair and a warm blanket. While an occasional meteor can be spotted at anytime, August 12th is the night to catch the Perseids meteor shower. A meteor shower occurs when the Earth passes through a cloud of debris usually left behind by a comet. Comet Swift-Tuttle is the source of the small grains of dust that create the Perseid shower. As one of the most famous showers, the Perseids meteor shower usually delivers an impressive display. This year expect a bright Moon to interfere (washing out dim meteors).

3. **Find the Apollo landing sites.** July marks the anniversaries of two moon landings. Apollo 11 landed on the southwestern shore of the Sea of Tranquility on July 20, 1969. Apollo 15 landed in the foothills of the Apennine Mountains on July 30, 1971. The southwestern shore of the Sea of Tranquility is visible 5 days after a New Moon. The Sun rises on the Apennine Mountains around the First Quarter Moon.

4. **Locate the Summer Milky Way.** Our solar system resides in one of the outer arms of a very large, rotat-

ing pinwheel of 200-300 billion stars called the Milky Way Galaxy. During the summer, we can see the inner arms of the pinwheel in the direction of the galactic core. Unfortunately, a dark sky is required, as excessive lighting is ruining the natural inky black of the celestial sphere. However, it still can be seen from parts of New Milford, late at night and once the moon has set. If you have never seen the Milky Way:

- Locate the Big Dipper (the most prominent asterism in the northern sky). The last two stars in the bowl of the Dipper point to the North Star.

- Imagine a line extended from the two Dipper stars, through the North Star and an equal distance beyond. You should now be between the constellations Cepheus and Cassiopeia. Cassiopeia is shaped like a W or and is the starting point for our journey down the Milky Way.

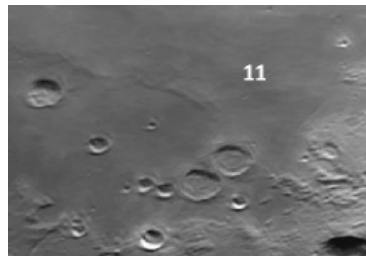
- The Milky Way flows from Cassiopeia south to Cygnus (the Swan or Northern Cross). Cygnus can be recognized by its brightest star Deneb (at the tail) and the three bright stars that form the wing.

- Continuing south, the bright star Altair provides the next navigation aid, directing us to Sagittarius, an asterism shaped like a teapot (next page). On a dark night, the star clouds of the Milky Way appear like steam from the spout of the teapot. The spout is also in the general direction of the center of our galaxy (26,000 light years away).

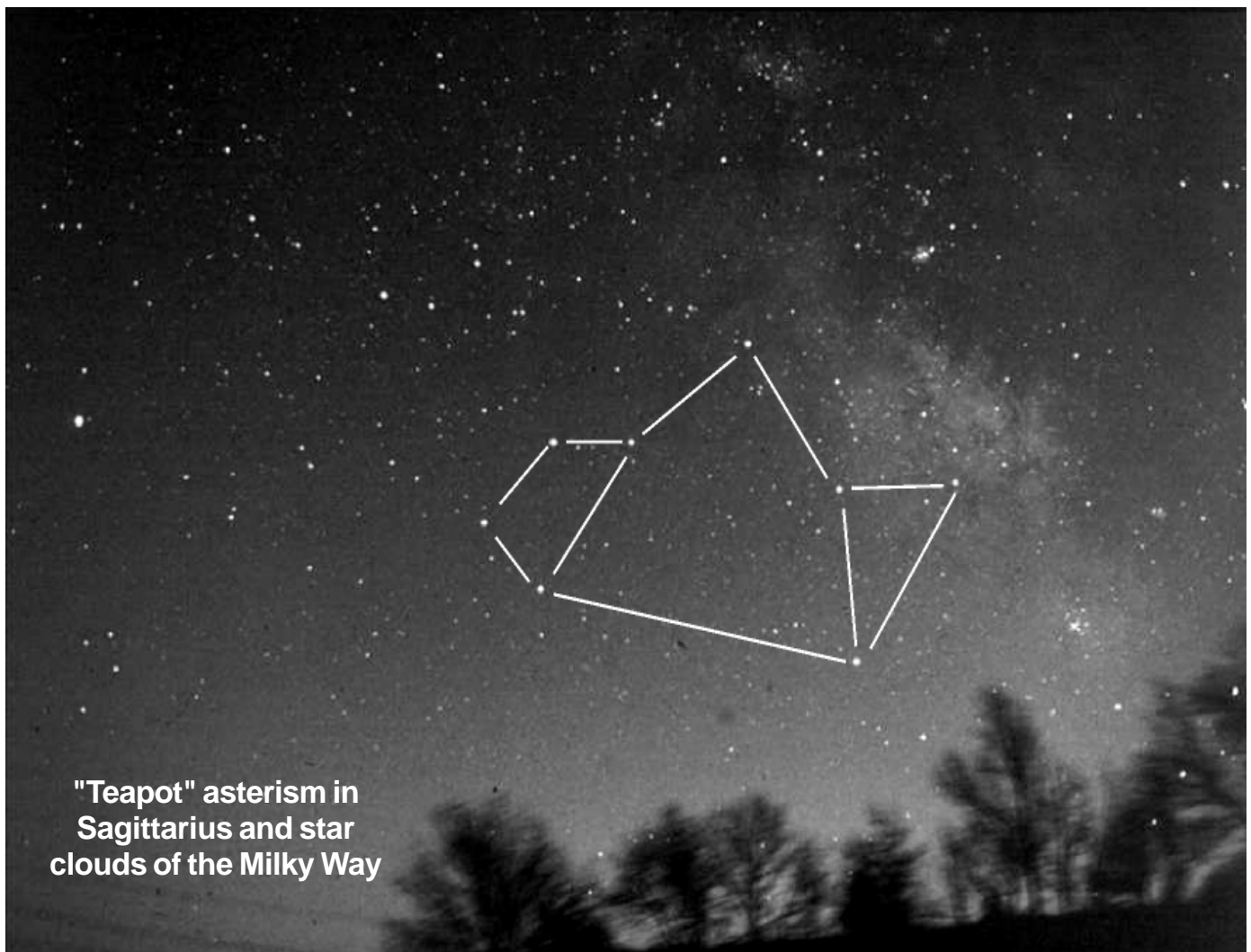
From a good observing site, you should see a band of cloudiness through this area of the sky. Through binoculars, the “clouds” can be resolved into bright areas populated by stars and darker areas with few or no stars. The darker patches are regions of gas and dust that obscure our view of the galactic center.



Sea of Tranquility and
Apollo 11 landing site



Apennines Mountains and
Apollo 15 landing site



**"Teapot" asterism in
Sagittarius and star
clouds of the Milky Way**

Liberty Bell

Almost 38 years to the day it disappeared below the surface of the Atlantic Ocean, Gus Grissom's Mercury capsule (Liberty Bell 7) was recovered from the ocean floor. The capsule was lost after Grissom's 15 minute suborbital flight in 1961 when the explosive hatch detonated prematurely, allowing seawater to flood the capsule.

After a fourteen year effort to locate the spacecraft, the Mercury capsule was hoisted to the surface on July 20, 1999 from a depth of almost 15,000 feet (deeper than the wreck of the Titanic). The recovery team was unable to find the hatch.

The spacecraft was in remarkably good condition and was subsequently transported to the Kansas Cosmosphere and Space Center for refurbishing. After a thorough cleaning, that included disassembly and reassembly of the capsule, Liberty Bell 7 is on permanent display at the Cosmosphere.

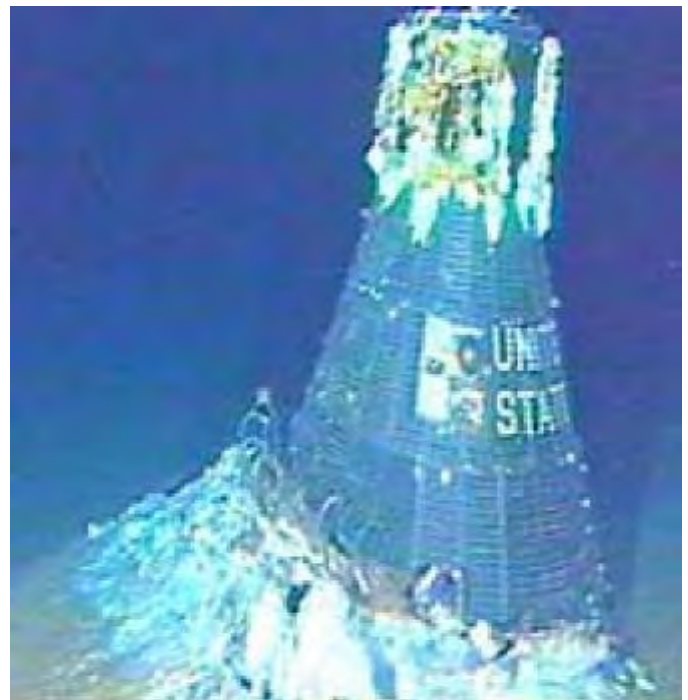


Photo Credir: Discovery Channel

Sunrise and Sunset

<u>Sun</u>	<u>Sunrise</u>	<u>Sunset</u>
July 1 st (EDT)	05:23	20:32
July 15 th	05:32	20:26
July 31 st	05:47	20:13
August 1 st	05:48	20:11
August 15 th	06:02	19:54
August 31 st	06:18	19:29

Astronomical and Historical Events

July

- 1st New Moon
- 1st Partial Solar Eclipse visible in the Indian Ocean
- 1st History: opening of the Smithsonian National Air & Space Museum (1976)
- 1st History: 100 inch mirror for the Hooker Telescope arrives on Mt. Wilson (1917)
- 1st History: discovery of Asteroid 6 Hebe by Karl Hencke (1847)
- 2nd History: launch of European Space Agency's Giotto spacecraft to Comet Halley (1985)
- 3rd History: launch of the ill-fated Nozomi spacecraft to Mars by Japan (1998)
- 4th Earth at Aphelion, furthest distance from the Sun (1.017 AU)
- 4th Asteroid 21 Lutetia at Opposition (9.4 Magnitude)
- 4th History: impact of Comet Tempel 1 by Deep Impact's impactor (2005)
- 4th History: landing on Mars by the Pathfinder spacecraft (1997)
- 4th History: Chinese astronomers record a "guest star" (supernova) in the constellation Taurus; visible for 23 days and 653 nights (1054); the remnant (Crab Nebula) later catalogued by Charles Messier as Messier 1 or M1
- 6th History: discovery of Jupiter's moon Lysithea by Seth Nicholson (1938)
- 6th History: Isaac Newton's "Principia" published (1687)
- 7th Moon at Perigee (closest distance to Earth)
- 7th History: launch of the Mars Exploration Rover B (Opportunity) (2003)
- 8th First Quarter Moon
- 8th Schedule launch of the Space Shuttle Atlantis (STS-135) to the International Space Station; final space shuttle launch
- 9th Second Saturday Stars – Open House at the McCarthy Observatory
- 9th Flyby of Saturn's largest moon Titan by the Cassini spacecraft
- 9th History: closest pass of Jupiter's cloud tops by the Voyager 2 spacecraft (1979)
- 10th Distant flyby of Saturn's moons Helene, Janus, Pan and Prometheus by the Cassini spacecraft
- 10th History: flyby of Asteroid 21 Lutetia by the European Space Agency's Rosetta spacecraft (2010). Rosetta is the first mission to attempt to orbit a comet and deliver a lander to its surface. It is expected to arrive at its destination (Comet 67P/Churyumov-Gerasimenko) in May 2014. Six months later, it will release a lander to the comet's nucleus.
- 10th History: Alvan Graham Clark born, optician and telescope maker (1832)
- 11th History: launch of the Soviet Gamma Observatory (1990)
- 11th History: Skylab re-enters into the Earth's atmosphere (1979)
- 12th History: launch of Soviet Mars orbiter Phobos 2 (1988)
- 13th History: Soviet Union launches Luna 15, a lunar lander and sample return mission, in an attempt to upstage Apollo 11; crashed during landing (1969)
- 13th History: Langley Research Center's birthday (1917)

Astronomical and Historical Events for July (continued)

- 14th History: flyby and first close-up view of Mars by the Mariner 4 spacecraft (1965)
- 15th Full Moon (sometimes called the Full Buck, Thunder or Hay Moon)
- 15th Kuiper Belt Object 20000 Varuna at Opposition (44.587 AU)
- 16th Scheduled arrival of the Dawn spacecraft at the asteroid Vesta
- 16th History: over twenty fragments of comet Shoemaker-Levy 9 collide with Jupiter between July 16th and the 22nd (1994); the comet had been discovered a year earlier by astronomers Carolyn and Eugene Shoemaker and David Levy
- 16th History: launch of Badr-A, first Pakistan satellite (1990)
- 16th History: launch of Apollo 11, with astronauts Neil Armstrong, Edwin “Buzz” Aldrin and Michael Collins, first manned lunar landing (1969)
- 16th History: first launch of a Proton rocket by the Soviet Union (1965)
- 16th History: first photo of a star other than our Sun (Vega) by Harvard University (1850)
- 17th History: docking (and crew handshake) of an Apollo spacecraft with astronauts Thomas Stafford, Vance Brand, and “Deke” Stayton with a Soyuz spacecraft with cosmonauts Alexei Leonov and Valeri Kubasov (the Apollo-Soyuz Test Project (ASTP)) (1975)
- 18th History: launch of Rohini 1, India’s first satellite (1980)
- 18th History: launch of Gemini X, with astronauts John Young and Michael Collins (1966)
- 18th History: launch of Soviet Zond 3 spacecraft; first successful flyby of Moon; transmitted photographs that included the far side (1965)
- 18th History: Allan Sandage born, astronomer specializing in observational cosmology (1926)
- 20th Mercury at its Greatest Eastern Elongation (27° separation from the Sun, as viewed from Earth)
- 20th History: discovery of Jupiter’s moon Callirrhoe (2000)
- 20th History: Gus Grissom’s Mercury capsule (Liberty Bell 7) retrieved from the Atlantic Ocean floor at a depth of 15,000 feet, 38 years after it had sunk after splashdown (1999)
- 20th History: Viking 1 lands on Mars (1976)
- 20th History: Apollo 11 lands on Moon at 4:17 pm EDT (1969); first step onto the lunar surface at 10:56 pm
- 21st Moon at Apogee (furthest distance from Earth)
- 21st History: launch of the Soviet Mars mission Mars 4 (1973)
- 21st History: launch of Mercury-Redstone 4 with astronaut Virgil (Gus) Grissom; second suborbital flight by the United States (1961)
- 21st History: discovery of Jupiter’s moon Sinope by Seth Nicholson (1914)
- 22nd History: landing of Soviet spacecraft Venera 8 on Venus (1972)
- 23rd Last Quarter Moon
- 23rd History: launch of Space Shuttle Columbia (STS-93) and the Chandra X-ray Observatory (1999); first mission commanded by a woman, Eileen Collins
- 23rd History: discovery of Comet Hale-Bopp by Alan Hale and Tom Bopp (1995)
- 24th History: first rocket launch from Cape Canaveral (Bumper/V-2 rocket) in 1950
- 25th History: Svetlana Savitskaya becomes the first woman to walk in space (1984)
- 25th History: launch of Soviet Mars orbiter Mars 5 (1973)
- 26th History: launch of the Space Shuttle Discovery (STS-114) “Return to Flight,” 907 days after the loss of Space Shuttle Columbia (2005)
- 26th History: launch of Apollo 15 with astronauts David Scott, James Irwin and Alfred Worden; fourth lunar landing (1971)
- 26th History: launch of Syncom 2, first geosynchronous satellite (1963)
- 27th Asteroid 9 Metis at Opposition (9.6 Magnitude)
- 28th History: launch of Skylab-3 astronauts Alan Bean, Jack Lousma and Owen Garriott (1973)
- 28th History: launch of Ranger 7; Moon impact mission (1964)
- 29th 76th Convention of Amateur Telescope Makers (Stellafane), Springfield, Vermont (through the 30th), see <http://stellafane.org/convention/2011/index.html>

Astronomical and Historical Events for July (continued)

- 29th South Delta-Aquarids meteor shower peak
- 29th History: Deep Space 1 flyby of Asteroid Braille (1999)
- 30th New Moon
- 30th Astronomical Society of the Pacific Education and Public Outreach Conference, Baltimore, Maryland, see: <http://www.astrosociety.org/events/meeting.html>
- 30th History: the Cassini spacecraft arrives at Saturn after a seven year journey (2004)
- 30th History: launch of the Wilkinson Microwave Anisotropy Probe (WMAP); mapped the Cosmic Microwave Background radiation and determined the age of the universe to be 13.73 billion years old to within 1% (2001)
- 30th History: Apollo 15 lands on Moon at 6:16 pm EDT (1971)
- 30th History: discovery of Jupiter's moon Carme by Seth Nicholson (1938)
- 30th History: Galileo observes Saturn's Rings (1610)
- 31st History: impact of the Lunar Prospector (1999)
- 31st History: flyby of Mars by Mariner 6 (1969)

August

- 1st Distant flyby of Saturn's moons Helene, Titan, Telesto, Methone and Rhea by the Cassini spacecraft
- 1st Alpha Capricornids meteor shower peak
- 1st Asteroid 2 Pallas at Opposition (9.5 Magnitude)
- 1st Asteroid 4 Vesta closest approach to Earth (1.227 AU)
- 1st History: discovery of Martian meteorite (shergottite class) SAU 051 in Oman (2000)
- 1st History: Maria Mitchell born, first woman to be elected as an astronomer to the American Academy of Arts and Sciences (1818)
- 2nd Moon at Perigee (closest distance to Earth)
- 3rd History: launch of the MESSENGER spacecraft to Mercury (2004)
- 4th History: launch of the Phoenix spacecraft to Mars (polar lander) (2007)
- 5th Tentative launch date for the Juno spacecraft to Jupiter
- 5th Asteroid 4 Vesta at Opposition (5.6 Magnitude)
- 5th History: flyby of Mars by the Mariner 7 spacecraft (1969)
- 5th History: birthday of astronaut Neil Armstrong (1930)
- 6th First Quarter Moon
- 6th Iota Aquarids meteor shower peak
- 6th History: launch of Vostok 2 and cosmonaut Gherman Titov; 2nd man in Space (1961)
- 6th History: Chinese astronomers first observe supernova in Cassiopeia; remained visible for more than 6 months (1181)
- 7th History: announcement of possible microfossils found in Martian meteorite ALH84001 (1996)
- 7th History: Viking 2 arrives at Mars (1976)
- 8th History: launch of Genesis spacecraft, solar particle sample return mission (2001)
- 8th History: launch of Pioneer Venus 2 (1978)
- 8th History: launch of the Soviet Zond 7 moon probe (1969)
- 9th History: launch of the Soviet Luna 24 spacecraft, third attempt (and only successful attempt) to recover a sample from Mare Crisium (1976)
- 10th History: launch of Mars Reconnaissance Orbiter to Mars (2005)
- 10th History: the Magellan spacecraft enters orbit around Venus; radar mapped 98% of the planet over the next two years (1990)
- 10th History: launch of the Lunar Orbiter 1 spacecraft, designed to photograph potential landing areas for the Surveyor and Apollo missions (1966)
- 11th History: Asaph Hall discovers Martian moon Deimos (1877)
- 12th Perseids meteor shower peak

Astronomical and Historical Events for August (continued)

- 12th History: launch of Echo 1, the first experimental communications satellite (1960)
- 13th Second Saturday Stars – Open House at the McCarthy Observatory
- 13th Full Moon (sometimes called Sturgeon, Green Corn or Grain Moon)
- 13th History: discovery of Mars' south polar cap by Christiaan Huygens (1642)
- 13th History: discovery of Mira, Omicron Ceti by David Fabricius (1596)
- 16th Kuiper Belt Object 2004 PG115 at Opposition (36.044 AU)
- 16th History: launch of Explorer 12 spacecraft, measured cosmic-ray particles, solar wind protons, and magnetospheric and interplanetary magnetic fields (1961)
- 17th History: launch of Venera 7; Soviet Venus lander (1970)
- 17th History: launch of Pioneer 7 (1966)
- 17th History: Asaph Hall discovers Martian moon Phobos (1877)
- 18th Moon at Apogee (furthest distance from Earth)
- 18th History: launch of Suisei; Japan's Comet Halley mission (1985)
- 19th History: launch of Soviet Sputnik 5 spacecraft with dogs Belka and Strelka (1960)
- 19th History: discovery of S Andromedae (SN 1885A), supernova in the Andromeda Galaxy and the first discovered outside the Milky Way Galaxy; discovered by Irish amateur astronomer Isaac Ward in Belfast on the 19th and independently the following day by Ernst Hartwig at Dorpat (Tartu) Observatory in Estonia (1885)
- 19th History: birthday of Orville Wright (1871)
- 19th History: John Flamsteed born; English astronomer known for his accurate astronomical observations and first Astronomer Royal (1646)
- 20th History: launch of Voyager 2 to the outer planets (1977)
- 20th History: launch of Mars orbiter/lander Viking 1 (1975)
- 21st Last Quarter Moon
- 21st History: launch of Gemini V with astronauts Gordon Cooper and Charles Conrad (1965)
- 22nd Neptune at Opposition (rising opposite the setting Sun and visible all night)
- 23rd Distant flyby of Saturn's moons Epimetheus and Atlas by the Cassini spacecraft
- 24th Distant flyby of Saturn's largest moon Titan by the Cassini spacecraft
- 24th History: Pluto reclassified as a Dwarf Planet (2006)
- 24th History: launch of the Soviet Luna 11 spacecraft to analyze the Moon's chemical composition, study gravitational anomalies and measure radiation levels (1966)
- 25th History: flyby of Neptune by the Voyager 2 spacecraft (1989)
- 25th History: launch of the Spitzer Space Telescope (2003)
- 25th Distant flyby of Saturn's moon Hyperion by the Cassini spacecraft
- 25th Northern Iota Aquarids meteor shower peak
- 25th Kuiper Belt Object 225088 (2007 OR10) at Opposition (85.390 AU)
- 26th History: flyby of the planet Saturn by the Voyager 2 spacecraft (1981)
- 28th New Moon
- 28th History: flyby of the asteroids Ida and Dactyl by the Galileo spacecraft (1993)
- 28th History: discovery of Saturn's moon Enceladus by William Herschel (1789)
- 29th History: discovery of a bright nova in the constellation Cygnus (Nova Cygni 1975); visible to the unaided eye for about a week (1975)
- 30th Moon at Perigee (closest distance to Earth)
- 30th History: discovery of first Kuiper Belt object (1992 QB1) by David Jewitt and Jane Luu
- 30th Scheduled launch of the Russian cargo carrying Progress spacecraft to the International Space Station
- 30th History: launch of Japanese satellite Yohkoh (Sunbeam) to observe phenomena taking place on the Sun (1991)
- 30th History: launch of STS-8 and astronaut Guy Bluford; first African-American in space and first night launch and landing by a shuttle (1983)

References on Distances

- The apparent width of the Moon (and Sun) is approximately one-half a degree ($\frac{1}{2}^\circ$), less than the width of your little finger at arm's length which covers approximately one degree (1°); three fingers span approximately five degrees (5°)
- One astronomical unit (AU) is the distance from the Sun to the Earth or approximately 93 million miles

International Space Station/Space Shuttle/Iridium Satellites

Visit www.heavens-above.com for the times of visibility and detailed star charts for viewing the International Space Station, the Space Shuttle (when in orbit) and the bright flares from Iridium satellites.

Solar Activity

For the latest on what's happening on the Sun and the current forecast for flares and aurora, check out www.spaceweather.com.

Past Links

Mercury	MESSENGER Mission: http://messenger.jhuapl.edu/
Venus	Venus Express Mission: http://www.esa.int/esaMI/Venus_Express/
Earth	Orbital Debris Quarterly News: http://www.orbitaldebris.jsc.nasa.gov/newsletter/newsletter.html Eclipses (Lunar and Solar): http://eclipse.gsfc.nasa.gov/eclipse.html ISS and Satellite Tracker: http://www.heavens-above.com/
Moon	Lunar Reconnaissance Orbiter Images: http://www.nasa.gov/mission_pages/LRO/main/index.html Kaguya (Selene) Flyover of Rupes Recta (Straight Wall): http://wms.selene.jaxa.jp/selene_viewer/jpn/observation_mission/tc/tc_058.html International Observe the Moon Night: http://observethemoonnight.org/ Moon Zoo: http://www.moonzoo.org/ Zoomable Nearside Image: http://wms.lroc.asu.edu/lroc_browse/view/wac_nearside
Mars	Mars Science Laboratory rover assembly: http://mars.jpl.nasa.gov/msl/mission/whereistherovernow/ Mars Reconnaissance Orbiter JPL site: http://marsprogram.jpl.nasa.gov/mro/
Mars	High Resolution Images: http://hirise.lpl.arizona.edu/index.php
Asteroids	Dawn Mission (Vesta and Ceres): http://dawn.jpl.nasa.gov/
Jupiter	Juno Mission: http://missionjuno.swri.edu/
Saturn	Cassini Flyby Video: http://apod.nasa.gov/apod/ap110315.html

Image Credits

Front page and graphic calendars: Allan Ostergren

Page 3: Venus and a crescent Moon flank the American flag at the Big Y supermarket in New Milford, CT.

The photo was taken in the supermarket's parking lot (dodging both pedestrian and vehicular traffic). The 2.5-second image was taken by Bill Cloutier with D-80 Nikon (f/7.1, ISO 800).

All other non-credited photos were taken by the author: Bill Cloutier

SECOND Saturday SKY

FREE EVENT
Every Month at the
John J. McCarthy Observatory
Behind the New Milford High School
860.946.0312
www.mccarthyobservatory.org

July 9th
8:00 - 10:00 pm

KID'S NIGHT

Sketching the Night Sky




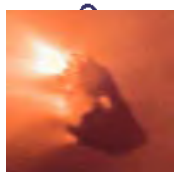


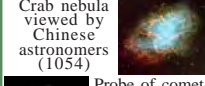



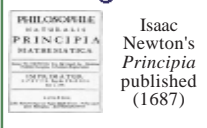
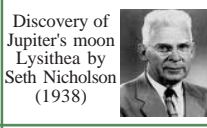


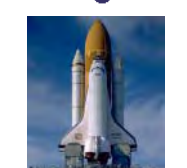
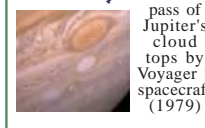

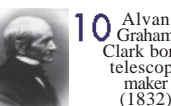





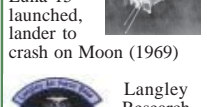




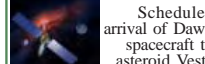


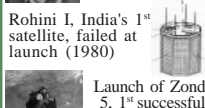
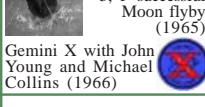

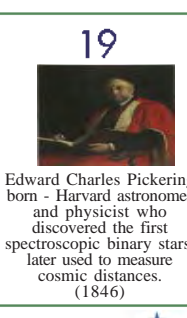

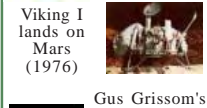




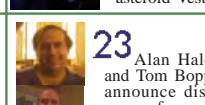




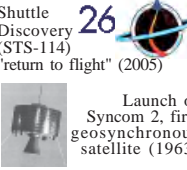
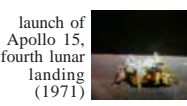




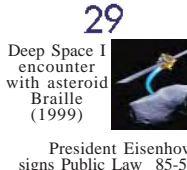
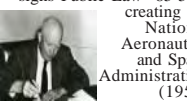


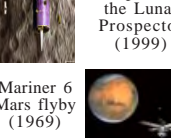








Refreshments
Family Entertainment
Activity Center
Stars & Planets
Rain or shine

Map

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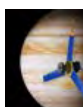



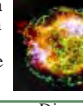










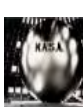

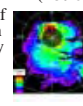



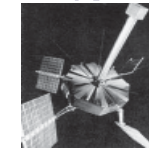



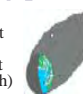
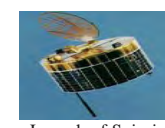










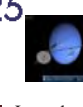






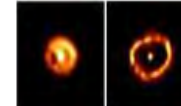





July 2011

Celestial Calendar

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday																																																																																				
	<div>Jun 2011</div> <table><tr><td>S</td><td>M</td><td>T</td><td>W</td><td>T</td><td>F</td><td>S</td></tr><tr><td></td><td></td><td></td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td></tr><tr><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td></tr><tr><td>19</td><td>20</td><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td></tr><tr><td>26</td><td>27</td><td>28</td><td>29</td><td>30</td><td></td><td></td></tr></table>	S	M	T	W	T	F	S				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30			<div>Aug 2011</div> <table><tr><td>S</td><td>M</td><td>T</td><td>W</td><td>T</td><td>F</td><td>S</td></tr><tr><td></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr><tr><td>7</td><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td></tr><tr><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td></tr><tr><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td></tr><tr><td>28</td><td>29</td><td>30</td><td>31</td><td></td><td></td><td></td></tr></table>	S	M	T	W	T	F	S		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31						<div>100-inch mirror for Hooker telescope arrives at Mt Wilson (1917)</div> <div>Partial solar eclipse visible in Indian Ocean</div> <div>Smithsonian Air & Space Museum birthday (1976)</div>	<div>Launch of European Soace Agency' Giotto spacecraft to Comet Halley (1985)</div>
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<div>3</div> <div></div> <div>Launch of ill-fated Japanese Nozomi spacecraft to Mars (1998)</div>	<div>4</div> <div>Mars Pathfinder landing (1997)</div> <div>Crab nebula viewed by Chinese astronomers (1054)</div> <div>Probe of comet Tempel 1 by Deep Impact impactor (2005)</div> <div>Earth at aphelion (furthest from Sun)</div>	<div>5</div> <div></div> <div>Discovery of Jupiter's moon Lysithea by Seth Nicholson (1938)</div>	<div>6</div> <div>Isaac Newton's <i>Principia</i> published (1687)</div> <div></div> <div>Discovery of Jupiter's moon Lysithea by Seth Nicholson (1938)</div>	<div>7</div> <div>Launch of Mars Exploration Rover B Opportunity (2003)</div> <div></div> <div>Moon at Perigee (closest distance to Earth)</div>	<div>8</div> <div></div> <div>Scheduled final launch of space shuttle Atlantis to the ISS</div>	<div>9</div> <div>Close pass of Jupiter's cloud tops by Voyager 2 spacecraft (1979)</div> <div>2nd Saturday Stars Open House McCarthy Observatory</div> <div></div>																																																																																				
<div>10</div> <div>Alvan Graham Clark born, telescope maker (1832)</div> <div></div> <div>Flyby of Asteroid 21 Lutetia by European Space Agency's Rosetta spacecraft (2010)</div>	<div>11</div> <div>Launch of Soviet Gamma Observatory (1990)</div> <div></div> <div>Total solar eclipse across South Pacific</div>	<div>12</div> <div></div> <div>Soviet Mars orbiter Phobos 2 launched (1988)</div>	<div>13</div> <div>Soviet spacecraft Luna 15 launched, lander to crash on Moon (1969)</div> <div></div> <div>Langley Research Center Birthday (1917)</div>	<div>14</div> <div></div> <div>First close-up view of Mars by Mariner 4 Spacecraft (1965)</div>	<div>15</div> <div></div> <div>Launch of Apollo 18 and Soyuz 19 in joint U.S./Soviet mission (1975)</div>	<div>16</div> <div>Apollo 11 Moon mission Armstrong, Aldrin, Collins (1969)</div> <div></div> <div>Schoemaker/Levy Comet fragments impact Jupiter (July 16-22, 1994)</div> <div></div> <div>Scheduled arrival of Dawn spacecraft to asteroid Vesta</div>																																																																																				
<div>17</div> <div></div> <div>Docking and handshakes of Apollo 18 and Soyuz 19 crews (1975)</div>	<div>18</div> <div>Allan Sandage born, cosmologist (1926)</div> <div></div> <div>Rohini I, India's 1st satellite, failed at launch (1980)</div> <div></div> <div>Launch of Zond 5, 1st successful Moon flyby (1965)</div> <div></div> <div>Gemini X with John Young and Michael Collins (1966)</div>	<div>19</div> <div></div> <div>Edward Charles Pickering born - Harvard astronomer and physicist who discovered the first spectroscopic binary stars, later used to measure cosmic distances. (1846)</div>	<div>20</div> <div>Apollo 11 lands on Moon (1969)</div> <div></div> <div>Viking I lands on Mars (1976)</div> <div></div> <div>Gus Grissom's capsule Liberty Bell raised after 30 years on ocean floor (1999)</div>	<div>21</div> <div>Launch of Soviet Mars 4 mission (1973)</div> <div></div> <div>Virgil (Gus) Grissom, 2nd U.S. suborbital flight (1961)</div>	<div>22</div> <div></div> <div>Landing of Soviet spacecraft Venera 8 on Venus (1972)</div>	<div>23</div> <div>Alan Hale and Tom Bopp announce discovery of comet Hale-Bopp (1995)</div> <div></div> <div>Launch of Space Shuttle Columbia and Chandra X-ray Observatory; first mission commanded by a woman, Eileen Collins (1999)</div>																																																																																				
<div>24</div> <div></div> <div>Bumper V-2, first rocket launch from Cape Canaveral (1950)</div>	<div>25</div> <div>Svetlana Savitskaya becomes first woman to walk in space (1984)</div> <div></div> <div>Launch of Soviet orbiter Mars 5 (1973)</div>	<div>26</div> <div>Shuttle Discovery (STS-114) "return to flight" (2005)</div> <div></div> <div>Launch of Syncom 2, first geosynchronous satellite (1963)</div> <div></div> <div>Launch of Apollo 15, fourth lunar landing (1971)</div>	<div>27</div> <div></div> <div>George Biddell Airy born, British Astronomer Royal (1801)</div>	<div>28</div> <div>Launch of Ranger 7, Moon impact mission (1964)</div> <div></div> <div>Launch of Skylab 3 (Bean, Pogue, Garriott) (1973)</div>	<div>29</div> <div>Deep Space I encounter with asteroid Braille (1999)</div> <div></div> <div>President Eisenhower signs Public Law 85-568, creating the National Aeronautics and Space Administration (1958)</div>	<div>30</div> <div></div> <div>Galileo observes Saturn's rings (1610)</div>																																																																																				
<div>31</div> <div>Impact of the Lunar Prospector (1999)</div> <div></div> <div>Mariner 6 Mars flyby (1969)</div>	<div>Phases of the Moon</div> <div></div> <div>First Quarter Waxing Gibbous Full Moon Waning Gibbous Last Quarter Waning Crescent New Moon Waxing Crescent</div> <div>July 6 July 13 July 21 July 28</div>																																																																																									

August 2011

Celestial Calendar

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1 Alpha Capricornids meteor shower peak  Maria Mitchell born, first woman elected as an astronomer to the American Academy of Arts and Sciences (1818)   Discovery of Martian meteorite SAU 051 in Oman (2000)	2  Moon at Perigee (closest distance to Earth)	3  Launch of MESSENGER spacecraft to Mercury (2004)	4  Launch of Phoenix Spacecraft to Mars (2007)	5 Astronaut Neil Armstrong born (1930)  Tentative launch date for the Juno spacecraft to Jupiter  Flyby of Mars by the Mariner 7 spacecraft (1969) 	6 Iota Aquarids meteor showers at peak  Gherman Titov, 2nd man in space (1961)  Cassiopeia Supernova observed by Chinese (1181) 
7  Viking 2 arrives at Mars (1976)  Martian meteorite found to contain possible life (1996)	8 Launch of Genesis Spacraft (2001)  Launch of Pioneer Venus 2 (1978)  Launch of Soviet Zond 7 moon probe (1969) 	9  Launch of the Soviet Luna 24 spacecraft, third (and only successful attempt) to recover a sample from Mare Crisium (1976)	10  Launch of Mars Reconnaissance Orbiter (2005)  Magellan spacecraft orbits Venus (1990)	11  Asaph Hall discovers Martian Moon Deimos (1877)	12 Perseid meteor showers at peak  Launch of Echo 1A, communications satellite in 2nd attempt (1960) 	13 Discovery of Mira, Omicron Ceti by David Fabricius (1596)  Discovery of Mars' south polar cap by Christiaan Huygens (1642)  2nd Saturday Stars Open House McCarthy Observatory 
14  Educator astronaut Barbara Morgan leads a Q&A session with children in Boise, Idaho from the space shuttle Endeavour, fulfilling legacy of Christa McAuliffe, who died in the 1986 Challenger disaster (2007)	15 	16  Launch of Explorer 12 spacecraft, measured cosmic-ray particles, solar wind protons, and magnetospheric and interplanetary magnetic fields (1961)	17 launch of Venera 7; Soviet Venus lander (1970)  Asaph Hall discovers Martian Moon Phobos (1877)  Launch of Pioneer 7 (1966) 	18 Moon at apogee (farthest from Earth)   Launch of Suisei, Japan's Comet Halley mission (1985)	19 Launch of Sputnik 5, with dogs Belka and Strelka (1960)  Birth of Orville Wright (1871)  Sir John Flamsteed born, English astronomer (1646) 	20 Launch of Mars orbiter/lander Viking 1 (1975)  Launch of Voyager 2 to outer planets (1977) 
21  Launch of Gemini V with astronauts Gordon Cooper and Charles Conrad (1965)	22  Neptune at Opposition rising opposite the setting Sun and visible all night	23 	24 Pluto reclassified as a dwarf planet (2006)   Launch of the Soviet Luna 11 spacecraft to analyze the Moon's chemistry, gravitation and radiation levels (1966)	25 flyby of Neptune by the Voyager 2 spacecraft (1989)  Launch of Spitzer Space Telescope (2003)  Meteor shower (Northern Iota Aquarids peak) 	26  Flyby of Saturn by Voyager 2 spacecraft (1981)	27 
28  Discovery of Saturn's moon Enceladus by William Herschel (1789)  Flyby of asteroids Ida and Dactyl by the Galileo spacecraft (1993)	29  Discovery of Nova Cygni in the constellation Cygnus (1975)	30  Discovery of first Kuiper Belt object, 1992 QB1, by David Jewet and Jane Luu  Launch of STS-8 and astronaut Guy Bluford, 1st African-American in space (1983)	31 	Phases of the Moon  Aug 6 Aug 13  Aug 21 Aug 28		